



**FLORENCE COPPER INC.**

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[florencecopper.com](http://florencecopper.com)

January 30, 2020  
HA File No. 132473-005

Arizona Department of Environmental Quality  
Attention: Maribeth Greenslade, Project Manager  
1110 West Washington Street  
Phoenix, Arizona 85007

**Re: Florence Copper Project  
Significant Amendment for Aquifer Protection Permit 101704, LTF 76820**

Dear Ms. Greenslade:

Florence Copper Inc. (Florence Copper) is submitting the following in response to the Comprehensive Request for Additional Information by the Arizona Department of Environmental Quality (ADEQ) dated December 30, 2019. In the letter, ADEQ has requested additional information and clarification of materials submitted with the Significant Amendment application transmitted to ADEQ on June 12, 2019. Florence Copper's responses to each Request are provided below under numbered headings that correspond to the numbered sub-parts of each request.

**Request 1:**

1. *Submit a financial demonstration, including a financial assurance mechanism, for the closure and post-closure costs that complies with the requirements of A.A.C. R18-9-A203(B), (C) and (G).*
  - a. *The letter signed by the chief financial officer must state that Florence Copper Inc. is financially capable of meeting the total closure and post-closure cost (\$34,468,500).*
  - b. *The closure cost estimate provided in the application and subsequent submittals divides the closure costs between an APP financial assurance mechanism and a financial assurance mechanism to be provided in accordance with Underground Injection Control (UIC) requirements to the U.S. EPA. The post-closure cost amount will be fully covered by the UIC financial assurance mechanism. The amounts for each financial mechanism are \$4,696,000 to ADEQ for the APP and \$29,772,500 to EPA for the UIC Permit.*
    - i. *Provide a financial mechanism to ADEQ for the APP; templates for the mechanism options are available on the ADEQ website  
<https://azdeq.gov/financial-responsibility-options-apps>*
    - ii. *Provide documentation for the financial assurance demonstration provided to EPA for the UIC permit.*

**Taseko**

### Response to Request 1:

- 1.a Attachment 1 is a letter from Bryce Hamming, Chief Financial Officer of Florence Copper, which states that Florence Copper is financially capable of meeting the total closure and post-closure costs associated with both the Aquifer Protection Permit (APP) and Underground Injection Control (UIC) Permit, a total estimated cost of \$34,468,500.
- 1.b.i Attachment 2 includes a copy of the current financial assurance instrument (performance surety bond) provided to ADEQ in the amount of \$1,247,000 to cover closure and post-closure costs associated with APP P-101704. Attachment 2 also includes a draft general purpose rider that will increase the performance surety bond amount to a total of \$4,696,000. Florence Copper will provide the final performance surety bond to ADEQ prior to the public comment period commencing. The ADEQ website (<https://azdeq.gov/financial-responsibility-options-apps>) provides templates for Certificates of Deposit, Trust Fund, Letter of Credit, Cash Deposit, and Guarantee financial assurance mechanisms. No template is provided for Performance Surety Bond, although that is an approved financial assurance mechanism listed on the website. Consequently, the materials provided in Attachment 2 do not include a completed template for performance surety bond. The draft performance surety bond is included in Attachment 2.
- 1.b.ii The closure cost estimate provided to the U.S. Environmental Protection Agency (USEPA) in support of the UIC Permit application is included as Attachment 3. Attachment 3 includes both a detailed cost table and a summary cost table, which were previously submitted to ADEQ with the October 4, 2019 UIC Permit application. In accordance with ADEQ requirements, the UIC closure cost estimate has been stamped by an Arizona Professional Engineer.

### Request 2:

- 2. *The FCI December 3, 2019 letter, includes Leak Collection and Removal System (LCRS) alert level calculations (Action Leakage Rate (ALR) and Large Leakage Rate (LLR)) for the new ponds (Water Impoundments, PLS and Raffinate) and the existing BHP Pond. Pursuant to A.A.C. R18-9-A202(A)(9), provide clarification for the following items:*
  - a. *The "average depth below freeboard" values appear too high based on the design drawings which indicate the PLS, Raffinate and Runoff Pond are 20' deep, and the Water Ponds are 60' deep. Please clarify*
  - b. *The ALR and LLR are shown in units of gallons per day per acre (gpda). The ALR and LLR in permits are typically set in units of gallons per day (gpd), not gpda. Is FCI proposing to calculate the ALR and LLR based on the wetted acreage at the time of measurement? If so, propose how this could be established in the permit monitoring table.*
  - c. *Please provide the ALR and LLR spreadsheet electronically so that ADEQ can review the formulas and unit conversions.*

### Response to Request 2:

- 2.a The average depth below freeboard values were calculated based on design drawings which have been updated since the submittal of the 12 June 2019 Significant Amendment Application. The current design drawings which have been released for construction include the Commercial Pond System Design Report included in Attachment 4. The average depths below freeboard previously submitted to ADEQ were correct and remain unchanged based on the design drawings released for construction (Attachment 4). The average depths below freeboard are listed in Table 1 of Attachment 5 for each of the process water ponds and water impoundments.
- 2.b The ALRs and LLRs have been updated to units of gallons per day and are included in Attachment 5. Florence Copper does not propose to calculate the ALR and LLR based on the wetted acreage at the time of the measurement.
- 2.c The ALR and LLR calculation spreadsheet has been transmitted electronically with this Letter (Attachment 6, Electronic Submittal).

### Request 3:

*Propose the content for an annual groundwater model update report using updated hydrologic parameters obtained from aquifer tests, routine monitoring, and operation of the facility pursuant to A.A.C. R18-9-A202(A)(9).*

### Response to Request 3:

Florence Copper proposes to update the groundwater model on an annual basis for the purpose of incorporating hydrologic and lithologic data generated from aquifer tests, routine monitoring, and operation of existing in-situ copper recovery (ISCR) wells. The annual groundwater model update will include:

- Comparison and incorporation of hydraulic conductivity values generated from one constant rate aquifer test conducted in each new resource block in which wells were installed during the previous year. If measured hydraulic conductivity values differ from those used in the model, the values will be updated in the model for the affected area and the model will be run to test the model calibration.
- Comparison and incorporation of porosity values determined from neutron porosity logs run in one well in each new resource block in which wells were installed during the previous year. If measured porosity values differ from those used in the model, the values will be updated in the model for the affected area and the model will be run to test the model calibration.
- Comparison of observed drawdown to model simulated drawdown. The cone of depression resulting from pumping operational ISCR wells will be monitored at the observation, perimeter, and point of compliance (POC) wells during ISCR operations. On an annual basis, Florence Copper will evaluate the magnitude of the observed cone of depression and compare the monitored conditions to the model results. If the magnitude of the measured cone of depression is similar to that generated by the model, the model will be considered to be representative of existing hydraulic conditions.

**Request 4:**

*The FCI December 3, 2019 letter, includes Attachment 2, Design Specifications. The Earthwork specification, Table 3 titled Frequency of Testing, includes the frequency for Laboratory and Field Moisture/Density Testing with a notation for footnote number 3, however, footnote number 3 is not defined. Pursuant to A.A.C. R18-9- A202(A)(3), please clarify.*

**Response to Request 4:**

Footnote 3 of Table 3 of the Earthwork Specification has been corrected. The text of the footnote reads:

“These testing requirements may be waived or modified by the Engineer in the field if moisture-density relationship cannot be determined using the specified ASTM Test Method.”

A revised and sealed copy of the Design Specifications is included in Appendix D of the Commercial Pond System Design Report presented in Attachment 4.

**Request 5:**

*The FCI December 3, 2019 letter, indicates that the storm water runoff control berm drawings and supporting analysis have not been completed for the commercial-scale ISCR facility. FCI proposes to submit the information as a compliance schedule item under the amended permit. As an important component of the BADCT demonstration for the ponds and water impoundments, this information may not be deferred to a later date and must be provided as part of this permit amendment application (A.R.S. 49-243).*

**Response to Request 5:**

Request 5 above clarifies that ADEQ is seeking the basis for storm water runoff protection for the ponds and water impoundments, rather than the entire wellfield and ISCR facilities. Florence Copper has retained an engineering design firm to design the commercial-scale plant facility and the site civil design. This design process will include the storm water runoff control features for the commercial ISCR facility and processing plant.

The topographic drainage area up gradient of the water impoundments is anticipated to remain relatively unchanged through the civil design process and commercial operations. This is true because the San Carlos Irrigation and Drainage District (SCIDD) northside canal lies a short distance to the north of the water impoundments. Successful operation of the canal requires that all storm water runoff generated up gradient of the canal be controlled to prevent damage to the canal. Consequently, all storm water runoff generated north of the canal is intercepted and controlled by canal structures. This limits the area that will generate storm water runoff that would impinge on the toe of the water impoundment berms. The area upgradient of the water impoundments that will generate runoff is shown in Attachment 7. Calculations presented in Attachment 7 demonstrate that the calculated flow velocity generated by runoff from the 100-year storm event are below the threshold that would cause erosion of the water impoundment embankments.

The pregnant leach solution (PLS) pond, raffinate pond, and runoff pond are located north of the northside canal in the planned ISCR processing facility area. The site civil has not yet been completed for the ISCR processing facility; however, conservative grading design has been completed for the purpose of designing the runoff pond (Attachment 4). This grading design reflects the area that may produce runoff up gradient of the PLS, raffinate, and runoff ponds. The ISCR processing area will be contoured to convey all of the storm water runoff generated on the site to the runoff pond, preventing appreciable amounts of runoff from eroding the pond embankments. Calculations presented in Attachment 7 demonstrate that the calculated flow velocity generated by runoff from the 100-year storm event are below the threshold that would cause erosion of the pond embankments.

The Haley & Aldrich analysis provided in Attachment 7 concludes that the ponds and water impoundments are protected from damage resulting from storm water runoff for the following key reasons:

- The ponds and water impoundments have been placed outside of the 100-year floodplain defined by the Federal Emergency Management Agency. The 100-year floodplain is shown on the pond and water impoundment design documents provided in Appendix C of Attachment 4.
- The water impoundments have been placed below the Northside Canal operated by SCIDD. The canal forms a runoff barrier that limits the drainage area contributing runoff flow adjacent the water impoundments.
- Flow from the north of the process ponds will be captured by the channel north of the ponds and directed to the runoff pond. Additionally, the PLS and raffinate ponds are constructed with raised berm crests which will prevent run-on from the ISCR plant site.
- The topographic area which may contribute upgradient surface flow to both the ponds and the water impoundments is limited.
- The estimated maximum storm water flow velocity at the water impoundments is less than the maximum recommended flow velocity to avoid erosion for the soils anticipated to be used for construction of the water impoundments.

The Haley & Aldrich analysis is included in Attachment 7.

#### **Request 6:**

*Provide documentation that the BHP pond liner is in good condition with no holes, tears or other defects, pursuant to A.R.S. 49-243.*

#### **Response to Request 6:**

The existing water impoundment (BHP Copper Inc. [BHP] water impoundment) is listed as "Evaporation Pond" under APP No. P-101704. The water impoundment received ISCR solutions generated by BHP testing conducted at the site from 1997 through 2004. The BHP water impoundment has not received ISCR solutions since hydraulic control was discontinued at the BHP test wellfield in 2004.

The BHP water impoundment liner system has been inspected and tested and found to have satisfactory liner integrity. Florence Copper conducted detailed testing and inspections of the liner system at the BHP water impoundment in 2010 and 2019. The liner testing reports are included in Attachment 8.

#### **Request 7:**

*Provide a description and figure(s) that indicate where the re-designed Annular Conductivity Device (ACD) will be located on the Class III wells in relation to the limit of the UIC aquifer exemption boundary, LBFU, MFGU and UBFU, pursuant to A.A.C. R18-9-A202(A)(3 and 9).*

#### **Response to Request 7:**

Both past and current UIC permits granted to Florence Copper required that the ACD be installed within the Upper Basin Fill Unit (UBFU) immediately above the Middle Fine Grain Unit (MFGU) or at the upward limit of the aquifer exemption where that limit is below the MFGU. The UIC aquifer exemption extends vertically to the Lower Basin Fill Unit (LBFU)-MFGU contact, or 200 feet above bedrock, whichever is further below ground surface.

In accordance with UIC requirements, Florence Copper proposes to install the re-designed ACD at the upward limit of the aquifer exemption defined in Part II.B.1.b of the UIC Permit as the LBFU-MFGU contact, or 200 feet above bedrock, whichever is further below ground surface. In accordance with requirements of UIC Permit R9UIC-AZ3-FY11-1, where the LBFU-MFGU contact is the upward extent of the aquifer exemption, Florence Copper will install the ACD no more than 10 feet above the MFGU; where the LBFU is thicker than 200 feet, Florence Copper will install the ACD no more than 210 feet above the bedrock contact. This ACD location is the same as that proposed in both the June 12, 2019 significant amendment application (APP application) submitted to ADEQ, and the October 4, 2019 UIC Permit application submitted to USEPA.

The proposed location of the ACD is shown on Figures 9-1 and 9-3 of the APP application, which convey design detail for the injection, recovery, perimeter, and observation wells. Figures 9-1 and 9-3 have been revised to show the upper extent of the aquifer exemption boundary and are included in Attachment 9. The vertical extent of the exempted aquifer is shown on the left side of the revised figures and the proposed location of the ACD is shown on the well casing immediately above the MFGU.

#### **Request 8:**

*Provide potentiometric surface maps of the LBFU and UBFU to verify the placement of POC wells relative to groundwater flow directions, pursuant to A.A.C. R18-9-A202(A)(8)(b)(iv).*

#### **Response to Request 8:**

Attachment 10 includes four potentiometric surface maps (Figures 1 through 4), reflecting the observed groundwater flow directions in the UBFU, LBFU, and Bedrock Oxide unit during each of the four quarterly monitoring events conducted during 2019. Figures 1 through 4 show that the proposed POC wells include one or more down gradient wells in each of the water bearing units existing beneath the site.

#### **Request 9:**

*Provide a description and additional supporting information regarding the buffering capacity of the UBFU and LBFU. Site specific material characterization based on acid neutralization potential using various methods such as Acid-Base Accounting (ABA), Net Neutralization Potential (NNP), Acid Neutralization*

*Potential (ANP), and paste pH should be cited to demonstrate the buffering capacity of the surrounding strata. This information is requested to support the discharge impact area analysis, pursuant to A.A.C. R18-9-A202(A)(8).*

**Response to Request 9:**

Florence Copper retained Daniel B. Stephens & Associates, Inc (DBS&A) to evaluate the buffering capacity of formation material surrounding the injection and recovery zone. At the request of Florence Copper, DBS&A evaluated the buffering capacity of the strata surrounding the proposed ISCR injection and recovery zone, which include the LBFU, and the bedrock oxide. No analysis was performed on the UBFU materials because the UBFU is separated from the injection and recovery zone by the LBFU and the MFGU, which is an aquitard that restricts groundwater flow between the LBFU and the UBFU. In the event of a vertical excursion of injected fluid, the fluid would have to pass through the 40-foot exclusion zone and the full thickness of the LBFU before reaching the MFGU aquitard. Such an excursion would be exposed to the buffering capacity of the uppermost 40 feet of the bedrock oxide, and then the buffering capacity of the full thickness of the LBFU.

The DBS&A report describes the buffering capacity of the strata surrounding the injection and recovery zone and includes the following key conclusions:

- Rocks in the oxide zone have a net neutralizing capacity.
- Rocks in the conglomerate (LBFU) have strong neutralizing capacity.
- Model simulations indicate that acidic solution will not migrate a significant distance from the ISCR wellfield in the event of a worst case upset condition that cuts power to the site for 30 days.
- The rocks within the injection zone contain minor amounts of sulfur and have little potential to generate acid.

The DBS&A report describing the buffering capacity of the bedrock oxide zone and the LBFU is included in Attachment 11. The neutralizing potential for each of the samples evaluated in the DBS&A report are listed in Table 4 of that document, and the lithologic unit associated with each sample is listed in Table 1 of the report. The laboratory data used for the DBS&A analyses are also included in Attachment 11.

**Request 10:**

*Attachment 13, Contingency Plan, indicates an emergency response coordinator will be the General Manager or other employee delegated with authority to act as emergency response coordinator, and that this information will be posted in the FCP Control Room and in each copy of the Contingency Plan. There is a number for Local emergency services (1-520-866-6411). What is this number and are there other people/numbers to contact?*

**Response to Request 10:**

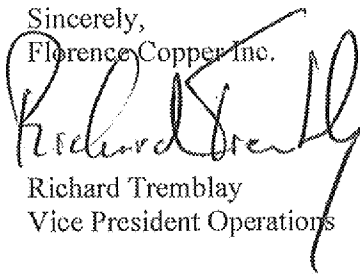
The local emergency services number to contact in the event of a condition that could pose an imminent and substantial endangerment to public health or the environment has been updated to 1-520-866-6684, which is for the Pinal County local emergency planning coordinator. Additionally, the Arizona Department of Public

Safety (1-602-223-2000) has been added to the local emergency services contact list. Other agencies and people to contact are listed in Section 13.4.3 of the Contingency Plan and include the following:

- National Response Center (1-800-424-8802);
- Arizona Department of Environmental Quality (1-602-771-2300);
- Florence Copper General Manager;
- Corporate Management; and
- Emergency Response Contractors.

We believe the following is responsive to ADEQ's comments and we are available to answer any questions you might have. Please contact me at 520-374-3984 if you require any additional information.

Sincerely,  
Florence Copper Inc.



Richard Tremblay  
Vice President Operations

Enclosures:

- Attachment 1 – Demonstration of Financial Capability
- Attachment 2 – Performance Surety Bond / Draft General Purpose Rider
- Attachment 3 – Closure Cost Estimate for UIC Permit
- Attachment 4 – Commercial Pond System Design Report
- Attachment 5 – Memorandum: Action Leakage Rates and Large Leakage Rates for Existing and Planned Impoundments
- Attachment 6 – Electronic Transmittal of ALR/LLR Calculations
- Attachment 7 – Storm Water Analysis
- Attachment 8 – Liner Testing Reports
- Attachment 9 – Revised Well Construction Diagrams (Figures 9-1 And 9-3)
- Attachment 10 – Potentiometric Surface Maps
- Attachment 11 – DBS&A Report: Geochemical Analysis of In Situ Copper Recovery